ALABAMA SUPPLEMENTS TO ENGINEERING FIELD HANDBOOK

CHAPTER 10. GULLY TREATMENT

Contents

FIGURES

CHAPTER 10. GULLY TREATMENT

PLANNING

Before any structure is planned, be sure and check downstream for erosion overfalls. If overfalls occur and the gully floor grade is greater than 1% for a dry bottom or 1½% for a wet bottom gully, other stabilization measures may be required.

DESIGN

Underground Outlet Terraces

The use of underground outlets in combination with other practices can play a very important role in gully control. This practice with terraces, diversions or water and sediment control basins can be used as the sole treatment on a small gully up to an integral part of a complex gully treatment. An underground outlet may be used in combination with grassed waterways, diversions, sub-surface and surface drains and water and sediment control basins to carry design flows. It is a good practice to convey runoff from small tributaries of a gully to the main water course. The underground outlet system is an economical structure for water erosion control, farmability and economics. Design of underground outlets can be found in Chapter 8 of this manual.

Water and Sediment Control Basins

Water and sediment control basins (structure) may be used on gullies with small watersheds (usually 25 acres or less) where site conditions permit. The structure can be used in combination with terraces and diversions and should have sufficient storage to contain the 10-year sediment yield from the watershed. It also should have a relatively stable bypass outlet since the sediment will gradually decrease the storage and may cause spillway flow.

Design is based on the appropriate standard plus sediment storage. Sediment storage will range from 0.01 to 0.25 inches/year depending on watershed conditions. Available storage may be calculated using the procedures in Chapter 8, Terraces.

Sediment storage needs may be estimated using the following table after the average annual soil loss in tons per acre has been determined for the area above the structure.

Soil Loss Tons per acre per year	Est. 10-year Sediment Yield-Inches per Unit of Drainage Area
1	.07
2	.14
3	.21
4	.28
5	.34
7	.48
10	.69
12	.83
15	1.03
18	1.24

Flumes (Concrete or Riprap Lined Waterways)

Flumes are most applicable where vegetation will not grow, where velocities would be erosive, or where time will not permit quick establishment of vegetation. Flumes should be installed with a one foot strip of sod along each side to protect easily eroding soils against undermining by surface flow or unexpected overflow.

All flumes will be designed with stable entrance and outlet conditions which will determine the maximum depth and velocity that can be contained in the waterway. The maximum design velocity for any lined waterway will not exceed those shown in Chapter 6. Special consideration will be given to the following design items for flume capacities larger than 50 cfs:

1. Inlet conditions will be analyzed to ensure that design depths are achieved in the upstream portion of the lined waterway.

2. Water surface profiles will be calculated for changes in grade in order to determine depth of flow for waterway design.

3. Side inlet conditions will be given special analysis to determine hydraulic conditions at the confluence.

4. Drawings and specifications will include action to handle all conditions found in Item 1 thru 3 above.

5. Flumes will be placed on firm (in situ) soils or controlled compaction applied to all fill areas.

6. Riprap will be used where soil conditions remain wet.

<u>Rock Gabion Structures</u>

Gabions are manufactured, compartmented, rectangular containers of galvanized steel hexagon wire mesh and filled with stone. The compartments add strength to the containers and help retain its shape during filling operations. Gabion structures are flexible and are the desirable structure on unstable foundations. Installations with filter cloth permits gabions to tolerate differential settlement when properly installed, without separation and failure of the structure. Gabion structures can stand high velocities and may be more economical than rock riprap structures when the rock and labor are readily available. Gabions can be used for a variety of applications such as weirs, channel or waterway linings, small drop structures, retainer walls, and aprons for other structures. These structures can be sized according to Chapter 6.

<u>Structures</u>

One of the most effective, yet costly, methods of stabilizing large gullies with high head cuts is the use of a mechanical spillway and an earth embankment. This type structure has worked satisfactorily on smaller gullies. The mechanical spillway can be of several types. Concrete or metal drop spillways, concrete chutes, concrete or metal pipe drop or hood inlet spillways have been used. The one most used by NRCS is the pipe drop spillway.

These structures are made up of three basic functional components: inlet, conduit, and outlet. The inlet is the point of entry of runoff and its size and shape controls or affects the hydraulic capacity of the structure. With drop or hood inlets, special attention should be given to insure that the inlet will function properly during the passage of trash.

The conduit is the means by which the runoff is conveyed from the inlet to the outlet. The conduit should rest on a stable foundation. Minor settlement of the foundation could result in damage or failure of the conduit.

The outlet is a crucial element of the structure. The energy developed as the runoff moves from the inlet to the outlet must be dissipated or accommodated by the outlet. In most cases this outlet will have to be constructed as a part of the structure. The successful behavior of the structure will depend heavily on the stable conditions of the outlet channel. The outlet structure for 24-inch diameter or larger pipe conduits should be excavated and lined with riprap. Outlets for drop and chute spillways will be constructed as an integral part of the spillway.

Drop spillways and chute spillways are open top structures and have several advantages over conduits. They have little difficulty handling trash because of a wide variety of spillway sizes. They handle large volumes of water efficiently and being exposed, lend themselves to easy inspection and maintenance. Drop spillways are adapted to relatively low heads while chute spillways can accommodate high heads.

The use of pipe conduits with drop or hood inlets has several features in its favor. In most cases they are less costly during initial installation; however, their life expectancy does not compare to that of a concrete chute. Also, it is easier to install a stable foundation for the pipe conduit outlet where downstream conditions are uncertain or unstable. The conduits downstream end can be stabilized with the use of one to three timber bents supported by timber piles with a riprap outlet.

It is desirable to install a pipe conduit on original ground rather than on fill. This usually dictates the selection of the drop inlet rather than the hood inlet or canti-lever pipe structure.

The selection of the proper structure type has to be based first on functional considerations, then on relative economics. If the structure cannot perform safely with a relatively long life, it is not a valid solution. It is important to consider all major problems, decide on relative structure life and then make certain that alternatives being studied have the same general life expectancy.

The design for gully structures discussed in this section and Chapter 6 may require the assistance of an engineer. See Chapter 6 for appropriate work sheets.

SURVEYS

See Figure AL10-2 for an example of engineering design and survey notes for grade stabilization structure (pipe drop with detention stage). See Figure AL10-3 for an example of engineering design and survey notes for a water and sediment control basin.

DESIGN GUIDELINES

Most pipe structures should have shaped basins rocked for protection. Gullies which produce large amounts of sediment may require an earth dam with a drop-inlet type debris basin. Sediment capacity should be designed to store the eroded soil rather than allow it to damage valuable land or structures below.

Quality erosion control design will consider the use of diversion berms, rock, mulches, underground outlets, filter fences, and hay bale diversions. Embankments must have a protective vegetative cover established and maintained for the life of the measure. The following may be used to enhance the erosion control plan:

1. Embankments approaching 40 feet in height have long slopes. Consideration should be given to placing a water holding berm at approximately each 20 foot vertical rise to reduce this slope length. A hay bale contour line can then be used to divide the remaining slope, if needed, into 10-40 foot vertical intervals.

   Runoff collected will be disposed of in a pipe or gutter that is lined with rock, sod, or established vegetation.

2. Embankment fills less than 40 ft. high should consider hay bales placed from the top between 10-40 ft. intervals. A good rule to thumb is to use 20-40 feet on erosion resistant soils, 20-30 ft. on moderately erodible soils and 10-20 ft. on easily eroded soils.

<u>GRADE STABILIZATION STRUCTURE (AL-ENG-11A)</u>
(pipe drop with detention storage)

The following definitions explain the use of tables and exhibits in the design and recording of data on Form AL-ENG-11A, GRADE STABILIZATION STRUCTURE (pipe drop with detention storage).

Job Class - determined from the criteria listed on Form AL-ENG-1, ENGINEERING JOB APPROVAL CLASSIFICATION CHART in the National Engineering Manual. The actual JOB CLASS is determined by the largest controlling factor.

Controlling Factor - the controlling factor that determines the job class according to AL-ENG-1 (examples: effective height, conduit, drainage area, etc.)

Soils - obtained from the soils map and refers to the soils in the watershed.

Hydro. Gr. - Hydrologic Group - obtained from Chapter 2 or Technical Release 55.

Land Use - refers to the type of land use in the drainage area (Row Crop, Pasture, Woods, etc.)

Trtmt. - refers to the treatment or practice and cover type on the land use.

Condition - hydraulic condition of the cover in the watershed (poor, fair, good).

DA - Drainage Area (acres) - determined by scale or planimeter from stereoscopic or soil maps. Critical drainage areas should be drawn from the contours on U.S.G.S. topographic maps and planimetered.

CN - The average curve number for the watershed (See Chapter 2.)

W/S Slope - Average Watershed Slope - the average watershed slope (percent) over the entire watershed.

Flow Length - Length in feet along the flow path from the hydraulically most distant point to the structure.

Tc - The time of concentration for the watershed in hours.

Rainfall ________ in. ________ yr. - the rainfall amount and duration of event used in the design for the principal spillway and emergency spillway.

Ia - Initial abstraction in inches from Table 2-4.

Ia/P - Ratio of Ia to Rainfall

Qu - Unit peak discharge (See Exhibits 2-ll or 2-lll)

Qps - the runoff in inches for the principal spillway storm (Use Figure 2-3 or Table 2-5).

qi - the peak inflow to the structure.

Vr - the volume of runoff converted to acre-feet. Obtain the inches of runoff for the rainfall amount and CN. (See Chapter 2).

Vs - the volume of storage available in the structure below the emergency spillway crest elevation in Ac-Ft.

Vs/Vr - the ratio of Vs to Vr.

qo/qi - ratio of peak outflow discharge to peak inflow discharge (Figure AL10-1).

Figure AL10-1. Approximate detention basin routing for rainfall Types II and III. (Source: TR-55).

Qpipe - the discharge for the principal spillway pipe to carry.

Pipe Size - record the barrel and riser diameters as needed to carry the Qpipe flow. Circle the type pipe designed for either sm. (smooth) or corr. (corrugated).

Emb. SS - the side slopes of the embankment.

TW - top width of dam.

Qes - the runoff in inches for the emergency spillway storm.

ESQp - the peak flow for the emergency spillway.

BW - the bottom width of the emergency spillway (ft.) to control the peak flow from the emergency spillway storm (Qes).

C. Sect. - the minimum length of the level section of the emergency spillway as determined from visual observation or determined from a plotted profile of the emergency spillway centerline (minimum 25 ft.).

Stage - the design depth of water in the reservoir above the crest of the emergency spillway.

S. Range - acceptable exist slope range for the emergency spillway.

F'board - safety factor applied as an elevation above the stage in the emergency spillway.

Other information - describes items particular to a specific site and survey. These items are self-explanatory.

WATER AND SEDIMENT CONTROL BASIN (AL-ENG-46)

The following additional definitions explain the use of tables and exhibits in the design and recording of data on Form AL-ENG-46, WATER AND SEDIMENT CONTROL BASIN [See GRADE STABILIZATION STRUCTURE (AL-ENG-11A) for other definitions].

Rainfall ____________ in __________ yr. - the rainfall amount and duration of event used in the design for the principal spillway.

10-yr. sed. - the estimated 10-year sediment yield in inches per unit of drainage area.

Sed. Stor. (SS) - the sediment storage in acre-feet needed in the basin to contain the 10-year sediment produced from the watershed.

AvailStor. (AS) - the volume of storage available in the structure below the emergency spillway crest elevation in Ac-Ft.

Qo(ps) - the acre-inches of runoff to be controlled by the pipe taking into account the sediment storage needed and the available storage.

Pipe Size - the size of the barrel and riser pipe needed to control the Qo(ps).

Other information - describes items particular to a specific site and survey. These items are self-explanatory.

5. Installation of measures

GRADE STABILIZATION STRUCTURES

A. Engineering Surveys for Design and Construction Layout
(SCS-ENG-28 and SCS-ENG-29 - Loose Leafs)

1. Complete title page (SCS-ENG-28) with sketch of practice location.
2. Show at beginning of survey: farmer's name, purpose of survey, name of practice, party members, duties, and date.
3. Describe benchmark.
4. Close out survey within allowable limits.
5. Soil borings. (If needed.)
6. Complete design data including placement of spoil and vegetative needs.
7. Include in surveys: cross sections, pipe elevations, waterline, and stakes for construction.
8. Design approval and date.
9. Review General Manual 450-407 for all components.

B. Construction and Performance Check
(SCS-ENG-29 - Loose Leaf)

1. Use Pond Construction Check Data form. (If needed.)
2. Make profile along centerline of top of complete dam.
3. Cross section at one or more locations of the completed dam.
4. Profile and cross section of completed spillway.
5. Elevation of completed riser and invert of barrel at outlet end of pipe spillway.
6. Statement on depth and area of normal pool if part of specification.
7. Other items as specified by General Manual 450-407.
8. General remarks and certification that practice meets construction plans and specifications.
9. Date and signature of person checking the practice.

U.S. Department of Agriculture
Natural Resources Conservation Service AL-ENG-22 Rev. 9-99

SCD *Dale County* Date *2/27/00*
Field Office *Ozark*
Name *Joe Smith*
Individual Group Unit of Gov't.
(circle one)

Job *Grade Stabilization Structure*
Design Survey *2/27/00* Const. Layout *2/27/00*
Constr. Check Other
Tract ________ Field Number ______ OPID ______
Location: Sec *26* T *6N* R *23E*
Location Description: *South of Co. Rd. 36 about 2 miles east of Rocky Head*

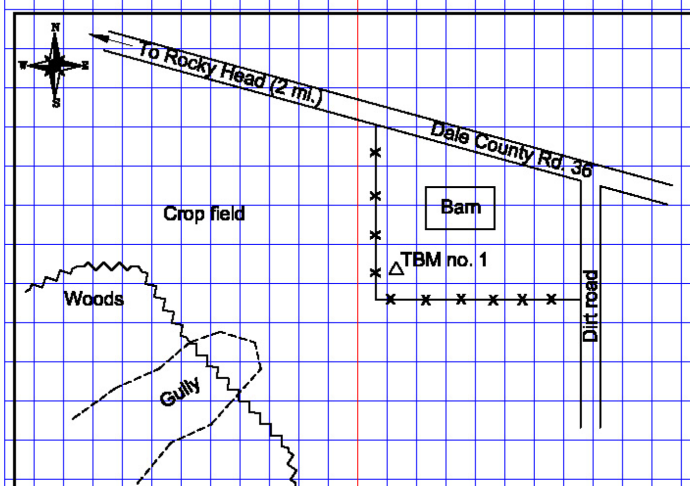


Figure AL10-2. Engineering Design and Survey Notes - Grade Stabilization Structure (pipe drop with detention storage.) (Sheet 1 of 4)

Station	B. S.	H. I.	F. S or grade rod	Elev. or planned elev.	
TBM no.1	5.03	105.03		100.00	
	Rod Reading	Water depth	Storage		
(NW end)					
0+00	0.2	0.0	0		
0+50	3.2	0.2	1		
1+00	6.9	3.9	150		
1+50	7.3	4.3	182		
2+00	8.4	5.4	287		
2+50	8.2	5.2	266		
3+00	8.0	5.0	246		
3+50	6.2	3.2	101		
4+00	5.1	2.1	43		
4+50	3.0	0.0	0		
		Total	1,276 cu. ft./ft.		
Land slope = 3.1 / 50 = 6%					
Stable pipe outlet			+19.0	86.0	
(Approx. 70' d.s. CL dam)					
Proposed bypass			+ 3.0	102.0	
TBM no.1			5.03	100.00	(No error)
SCS-ENG-29 (2-80)					

Joe Smith — & - *R. Mann*

Grade Stabilization Structure — - *K. Tyler*

Design Survey - Layout — *Mild, clear 2/27/00*

Dale Co., AL

Nail in West side of 10" sweetgum, 50' SW of barn.

U. S. Dept. of Agriculture
Natural Resources Conservation Service

AL-ENG-11A
Rev. 6/04

GRADE STABILIZATION STRUCTURE
(pipe drop with detention storage)

Job Class I Controlling Factor N/A

Soils Dothan Hydro. Gr. B

Land Use Row Crops Trtmt. C&T Condition Good

DA 20 ac. CN 71 W/S Slope 6 %

Flow Length 1500 ft. Tc 0.39 hrs.

Rainfall (ps) 4.8 in. 2 yr. & (es) 8.5 in. 25 yr.

Ia 0.817 in. Ia/P(ps) 0.17 $q_{u(ps)}$ 0.67 cfs/ac/in Qps 1.97 in.

PS $q_p = q_i$ = 0.67 $q_{u(ps)}$ X 20 DA X 1.97 Qps = 26.4 cfs

Vr = [1.97 (in) x 20 (DA)] / 12 = 3.28 AF

Vs = (1276 cf/ft x 50 ft.) / 43560 = 1.46 AF

Vs/Vr = 1.46 (Vs) / 3.28 (Vr) = 0.45 q_o/q_i = 0.21

Qpipe = 0.21 (q_o/q_i) x 26.4 (q_i) = 5.5 cfs

Pipe Size = 12 in. (sm./corr.) barrel; 15 in. riser

Emb. SS = 3 : 1 TW = 8 ft.

Ia/P(es) 0.0961 $q_{u(es)}$ 0.7 cfs/ac/in Qes 5.02 in.

ES q_p = 0.7 $q_{u(es)}$ X 20 DA X 5.02 Qes = 70.3 cfs

BW = 35 ft. C. Sect. = 25 ft. Stage = 1.0 ft.

S. Range = 1 to 4 F'Board = 1.0 ft.

El Riser 101.0 El Emer S/W 102.0 El Top of Dam 104.0

Settlement 5 % Pond Use Grade stabilization

Drain 122 ft. of 12 in. Corrugated plastic Pipe

Riser 10 ft. of 15 in. Corrugated plastic Pipe

Quantity of Fill --- CY Vegetation Bermuda and Bahia

Design By R.M.M. Checked By K.T.

Pipe Length = 6(104 - 86) + 8 + 6 = 122 ft.

Figure AL10-2. Engineering Design and Survey Notes - Grade Stabilization Structure (pipe drop with detention storage.) (Sheet 2 of 4)

Station	B. S.	H. I.	F. S or grade rod	Elev. or planned elev.	
TBM no.1	6.02	106.02		100.00	
0+00			+2.0	104.0	
0+50			+1.9	104.1	
1+00			+1.7	104.3	
1+50			+1.7	104.3	
	Top Riser		+5.0	101.0	
2+00			+1.6	104.4	
2+50			+1.6	104.4	
3+00			+1.6	104.4	
3+50			+1.7	104.3	
4+00			+1.7	104.3	
4+50	(Bt. S/W)		+4.0	102.0	
4+70	(CL S/W)		+4.0	102.0	
SCS-ENG-29 (2-80)					

Joe Smith — & - R. Mann

Grade stabilization structure — - K. Tyler

Construction check survey — Mild, cloudy 3/15/00

U.S. D.S.

1.0

1.7

1.7

-0.1 O.K.

1.5

Riser = 5.1

1.5

$\frac{12'}{3.8'}$ $\frac{12'}{4'}$ $\frac{12'}{4'}$ $\frac{12'}{3.8'}$ $\frac{12'}{3.9'}$

$\frac{9.4}{28'}$ $\frac{5.6}{16'}$ $\frac{1.6}{4'}$ $\frac{1.5}{0'}$ $\frac{1.5}{4'}$ $\frac{5.5}{16'}$ $\frac{9.3}{28'}$ $\frac{13.2}{40'}$

1.6

1.6

1.6

4.0

4.0

Figure AL10-2. Engineering Design and Survey Notes - Grade Stabilization Structure (pipe drop with detention storage.) (Sheet 3 of 4)

Station	B. S.	H. I.	F. S or grade rod	Elev. or planned elev.	
		106.02			
4+90			*+4.0*	*102.0*	
5+05					
		Profile S/W			
0+00					
0+25	*(Begin Control)*		*+4.0*	*102.0*	
2+00	*(End Control)*		*+4.0*	*102.0*	
1+00	*Exit*				
1+50					
TBM no. 1			*6.02*	*100.00*	
				(No error)	
SCS-ENG-29 (2-80)					

Joe Smith *Same party and date*

Construction check survey (cont'd.)

0.1

S/W Bt = 40' o.k. *4.1*

5:1

1.0

6.0

8%

4.0

4.0

1.9%

5.0

5.9

All disturbed areas seeded and mulched.

Construction meets plans and specs.

R. Mann

3/15/00

Figure AL10-2. Engineering Design and Survey Notes - Grade Stabilization Structure (pipe drop with detention storage.) (Sheet 4 of 4)

WATER AND SEDIMENT CONTROL BASIN

A. Engineering Surveys for Design and Construction Layout
(SCS-ENG-28 and SCS-ENG-29 - Loose Leafs)

1. Complete title page (SCS-ENG-28) with sketch of practice location.
2. Show at beginning of survey: farmer's name, purpose of survey, name of practice, party members, duties, and date.
3. Describe benchmark.
4. Close out survey within allowable limits.
5. Soil borings. (If needed.)
6. Complete design data including placement of spoil and vegetative needs.
7. Include in surveys: cross sections, pipe elevations, waterline, and stakes for construction.
8. Design approval and date.
9. Review General Manual 450-407 for all components.

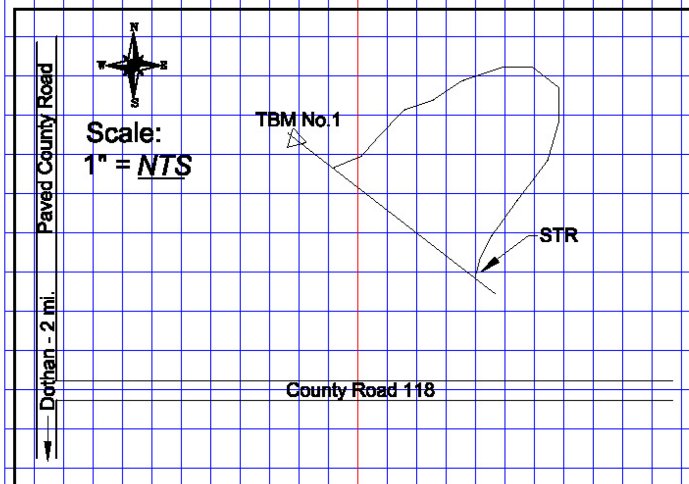
B. Construction and Performance Check
(SCS-ENG-29 - Loose Leaf)

1. Use Pond Construction Check Data form. (If needed.)
2. Make profile along centerline of top of complete dam.
3. Cross section at one or more locations of the completed dam.
4. Profile and cross section of completed spillway.
5. Elevation of completed riser and invert of barrel at outlet end of pipe spillway.
6. Statement on depth and area of normal pool if part of specification.
7. Other items as specified by General Manual 450-407.
8. General remarks and certification that practice meets construction plans and specifications.
9. Date and signature of person checking the practice.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SCD *Houston County* Date *2/5/96*
Field Office *Dothan*
Name *Jim McCallister*
Individual Group Unit of Gov't.
(circle one)

Job *Water and Sediment Control Basin*
Design Survey *2/5/96* Const. Layout *2/5/96*
Constr. Check *2/13/96* Other
Ident. No. *G-47* Field No. *3*



Legal Description:
______________________ Sec ____ T _____ R______
or
Location: ____________________________________
____

SCS-ENG-28 REV. 5-75

Figure AL10-3. Engineering Design and Survey Notes - Water and Sediment Control Basin (Sheet 1 of 3)

Station	B. S.	H. I.	F. S or grade rod	Elev. or planned elev.	
TBM no.1	*4.04*	*104.04*		*100.00*	
	Rod Reading	Water depth	Storage		
(East end)					
0+00	*1.9*	*0.0*	*0*		
0+50	*3.2*	*0.2*	*1*		
1+00	*6.9*	*3.9*	*150*		
1+50	*8.4*	*5.4*	*287*		
2+00	*16.6 (10.0)*	*7.0*	*482*		*F=66'*
2+50	*7.9*	*4.9*	*237*		
3+00	*6.2*	*3.2*	*101*		
3+50	*5.1*	*2.1*	*43*		
4+00	*4.5*	*1.5*	*22*		
4+50	*3.0*	*0.0*	*0*		
		Total	*1,323 cu. ft./ft.*		
Land slope = 3.1 / 50 = 6%					
TBM no.1			*4.04*	*100.00*	
				(No error)	
SCS-ENG-29 (2-80)					

Jim McCallister ⊼ & ◫ - *R. Mann*
Water & Sed. Control Basin ϕ - *K. Tyler*
Design Survey Layout *Cloudy, cool 2/5/95*
Houston Co., AL

Nail in 10th post from corner s. line

U.S. Dept. of Agriculture
Natural Resources Conservation Service

AL-ENG-46
Rev. 6/04

WATER AND SEDIMENT CONTROL BASIN

Job Class I Soils Dothan Hydro. Gr B

Land Use Row Crops Trtmt. C&T Condition Good

DA 10 ac. CN 71 W/S Slope 6 %

Flow Length 750 ft. Tc 0.22 hrs.

Rainfall 7.2 in. 10 yr. 10 yr.sed. = 0.34 in.

Vr = [3.79 (in) x 10 (DA)] / 12 = 3.2 AF

Sed.Stor.(SS) = [0.34 (10 yr.sed.) x 10 (DA)]/12 = 0.3 AF

Avail.Stor.(AS) = (1323 cf/ft x 50 ft.)/43560 = 1.5 AF

Qo(ps) = [3.2 (Vr) + 0.3 (SS) - 1.5 (AS)] x 12 = 24 Ac-in

Pipe Size = 6 in. (sm./corr.) barrel; 8 in. riser

Emb. SS = 3 : 1 TW = 8 ft.

El Riser 100.0 El Emer S/W 101.0 El Top of Dam 102.0

Settlement 5 % Pond Use Sediment Control

Drain 150 ft. of 6 in. CP Pipe

Riser 10 ft. of 8 in. CP Pipe

Quantity of Fill -- CY

Vegetation Bermuda and Bahia

Design By R.M. Checked By K.T.

Figure AL10-3. Engineering Design and Survey Notes - Water and Sediment Control Basin. (Sheet 2 of 3)

Station	B. S.	H. I.	F. S or grade rod	Elev. or planned elev.	
TBM no.1	6.17	106.17		100.00	
0+00			+3.7	102.5	
0+50			+3.6	102.6	
1+00			+3.4	102.8	
1+50			+3.3	102.9	
2+00			+2.9	103.3	
2+50			+3.3	102.9	
3+00			+3.5	102.7	
3+50			+3.5	102.7	
4+00			+3.5	102.7	
4+50			+5.2	101.0	
TBM no.1			6.17	100.0	(No error)
SCS-ENG-29 (2-80)					

Jim McAllister — & - *R. Mann*

Water & sed. control basin — - *K. Tyler*

Construction check survey — *Clear, cold* *2/13/96*

See Desc.

U.S.					D.S.
		3.5			
		3.5			
		3.4			
		3.2			
6.8 / 16'	2.8 / 4'	2.7 / 0'	2.6 / 4'	6.6 / 16'	10.6 / 28'
		3.0			
		3.3			
		3.4			
		3.4			
		5.2			

Used 150' - 6" CPT
10' - 8" CPT
10' - 6" PVC
Animal guard installed

All disturbed areas seeded to bermuda and bahia and mulched.
Construction meets plans and specifications.
R. Mann 2/13/96

Figure AL10-3. Engineering Design and Survey Notes - Water and Sediment Control Basin. (Sheet 3 of 3)